Contribution ID: **21** Type: **Keynote**

Monitoring Chemical Processes in (Photo)Catalysts and Energy Storage Materials by Operando X-Ray Absorption Spectroscopy

Wednesday, 14 September 2022 15:00 (30 minutes)

X-ray absorption spectroscopy (XAS) is a powerful tool for characterisation of local structure and chemical state of selected elements in di fferent new functional materials and biological or environmental samples. The XAS spectroscopy is based on extremely bright synchrotron radiation X-rays sources, which allow precise characterisation of bulk, nanostructured or highly diluted samples. The rapid development of extremely bright synchrotron sources of X-ray and ultraviolet light in recent years has opened new possibilities for research of matter at the atomic or molecular level, indispensable in the development of new functional nanostructured materials with desired properties. The talk will present the possibilities offered by X-ray absorption spectroscopy with synchrotron light for ex-situ or operando characterization of various functional porous and other nanomaterials, before, after and during their operation [1,2,3,4]. New generation of synchrotron light sources also opened the possibility of combining X-ray absorption with high-resolution emission [5] an d inelastic scattering spectroscopy [6], and microscopy with sub-micron resolution [7]. Examples of operando XANES and EXAFS analysis to track changes in the valence states and local structures of selected elements in different energy storage materi als and in various (photo)catal ysts, during chemical reactions under controlled reaction conditions, will be presented, which provided insight into the dynamic functional properties and reaction mechanisms of these materials. Access to SR facilities of Petra III (beamlines P65, P64 and P01), ESRF (beamlines BM23, ID21, ID26) and Elettra (beamlines XAFS, XRF), for the presented research is kindly acknowledged.

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